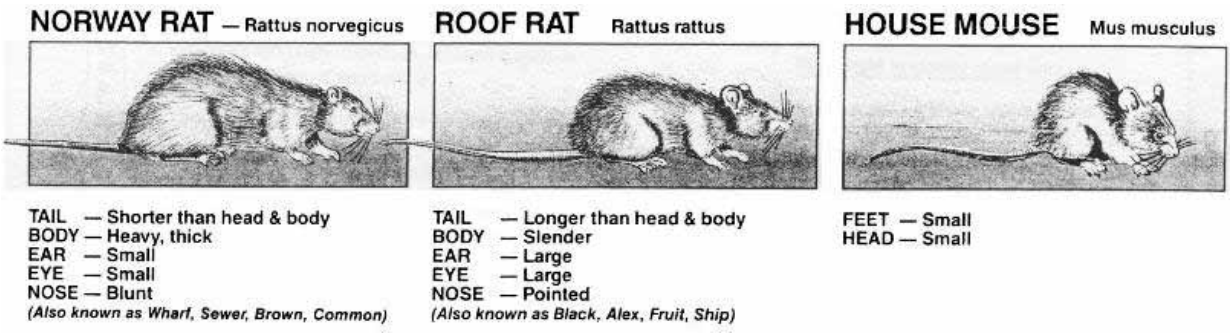
City of Royal Oak
Rodent Information

City of Royal Oak
211 Williams St.
Royal Oak, MI 48068
Hotline (248)246-3238 Fax (248)246-3006
www.ci.royal-oak.mi.us

DOMESTIC RODENTS

Some General Tips on Rodent Control



Droppings

Name	Average Weight	Body	Tail	Ears	Color	Food Prefs	Consumption per day	Droppings per day	Urine per day	Habits
Norway Rat Rattus Norvegicus	10-17 ounces	Heavy, broad, 7"-10" long, blunt	6"-8.5" long, loghter color on underside	Avg, close to body	Brown to black on back and sides, gray to yellow-white on belly	Meats, fish, flour, fruits, vegetables. Eats most any human food	3/4 - 1oz. Food 1/2 - 1oz. water	30-180	15.7cc	Usually nests in basements & lower portions of buildings. Burrows in soil extensively. Active primarily at night. Fair climber, good swimmer.
							6-18 young in litter	3-7 litters per year	Adult life 18 mos.	
Roof Rat Rattus rattus Alexandrinus	6 - 12 ounces	Slender body 6.5" - 8" long, pointed muzzle	7.5"-10" long. Uniform color, top & bottom	Large, prominent	Tawny back grayish-white underparts	Seeds, fruits, vegies, grains, eggs, etc	1/2 - 1oz food, up to 1oz water	30-180	15.7cc	Usually enters and mests in upper portions of buildings. May nest outside in trees (esp. palms), ivy, etc. Burrows very little. Excellent climber. Active at night.
							6-14 young in litter	2-7 litters per year	Adult life 16 mos.	
House Mouse Mus musculus	Less than 1oz	Avg body 2.5"-3.5" long	3"-4"	Large, prominent	Dusky gray on black, lighter gray on belly.	Meats, grains, cereals, seeds, fruits, vegies. Eats most any type human food	1/10 oz food 1/20oz water	50	1.75cc	May nest in any portion of a building near food. Has an average range of 50ft. from nest. Active mostly at nught. Nibbles small amounts of food frequently, rather than having large meals.
							6 young in litter	6 litters per year	Adult life 15-18 mos.	

INSPECTION
Rodents behave predictably. A rodent control expert is a detective searching for clues that point to an infestation. This knowledge is then used to choose appropriate rodent control tools and techniques and when to use them.

The Inspection Process

- Interview residents for information about rodent sightings and sounds.
- Perform a thorough inspection, beginning with the exterior premises, if appropriate.
- Think three-dimensionally, looking both high and low. A rule-of-thumb is to check 3 feet above both the ground and objects attached to the building.
- Identify interior and exterior problem areas including: runways, nests, feeding sites, water supplies, vents and other openings, burrows, harborages, pipe outlets and inlets and holes or cracks in the structure.
- Check all dark areas with a flashlight.

Physical Signs of Infestation - Look for these common signs of rodent infestation:

Runways - Paths will form between feeding and harborage areas. Rodents memorize their territory through kinesthetic (physical) memory and use the same paths again and again. They prefer to move along objects. Identifying rodent movement patterns helps to effectively place traps and bait stations.

Droppings - Droppings and urine are left wherever rodents travel or rest, especially in corners. Identify the rodent type by the size and shape of droppings. Use a palette knife to check droppings - fresh droppings are soft and shiny, while older droppings are gray, crusted and easy to break.

Population - Estimating populations is difficult. Because commensal rodents are primarily nocturnal, daytime rodent sightings may indicate a significant population.

Urine/Odor - A distinctive, musky odor may be present. Look for urine stains. Rodent urine is visible under black light. However, many other household and commercial products also fluoresce.

Gnaw Marks - Fresh gnaw marks are light and will darken over time. Scratch-like marks approximately 1/16-inch are made by mice. Clear 1/8-inch gnaw marks are made by rats.

Rub Marks - Rodents leave rub marks from body oil, grease and dirt along the walls they travel. New rub marks will smear. Old rub marks are darker and may flake off.

Tracks - Footprints and tail drags may be seen in dusty locations. To view difficult-to-see tracks, shine a strong flashlight at a low angle across the dust. A non-toxic tracking powder placed on a suspected rodent trail, and re-inspected the following day, also may assist in identifying tracks.

Upset Pets - House pets, such as cats and dogs may become agitated when they hear rodents gnawing, digging, running and fighting.

Inspection Tools

- Flashlight with a strong beam
- Black light to identify rodent urine
- Knife, palette knife or spatula to test age of droppings
- Specimen bag or plastic container to collect unknown specimens
- Protective gloves
- Knee pads
- Clipboard, graph paper and pencil to diagram building and take extensive notes
- Inspection check list
- Binoculars
- Respirator with HEPA filter

REPRODUCTION

Mice and rats reproduce rapidly, as is generally the case with small prey animals. Their relatively short life spans, short gestation periods and rapid sexual maturity make effective rodent control critical. The reproductive cycle and number of rodent offspring increases with adequate food, water and harborage.

House Mouse Reproduction Cycle

- Mice sexually mature and mate in as little as 5 weeks. Generally, sexual maturity is reached in 5 to 8 weeks.
- Female mice reproduce up to 8 times in their lifespan, with litters averaging 4 to 7 pups. Therefore, a single female may produce up to 56 offspring annually.

Rat Reproduction Cycle

- Norway and roof rats can sexually mature and mate at 8 to 12 weeks of age.
- Norway rats average 8 to 12 pups per litter, averaging 4 to 7 litters per year.
- Roof rats average 4 to 8 pups per litter, averaging 4 to 6 litters per year.

Related Reproductive Characteristics

House mice, Norway rats and roof rats share several reproductive characteristics:

- After giving birth, they can be in heat and become pregnant again in as little as 24 to 48 hours.
- Females can be pregnant and still lactate to feed their current litter of pups. However, the gestation period may be slightly longer in this case.
- They will reproduce year-round in stable environments with adequate food, water and harborage. Less favorable conditions limit reproduction to spring and autumn.
- House mice, Norway rats and roof rats live approximately one year.

EXCLUSION, SANITATION, TRAPPING

Exclusion

The best way to keep buildings rodent free is to prevent rats and mice from getting inside. Rodents fit through tiny openings and can gnaw through wood, lead, aluminum, copper, cinder block and uncured concrete. The following measures, with the proper materials, will make buildings less accessible to rodents.

- Mice can gnaw their way through openings as small as 1/4 inch. Rats can gnaw through openings as small as 1/2 inch.
- Patch openings in walls larger than 3/8 inch using gnaw-proof materials, such as steel sheeting, 1/4 inch hardware cloth, galvanized steel and concrete. Holes may be plugged with steel wool prior to patching. An aerosol foam spray may then be used to seal remaining cracks.
- Close outside doors tightly when not in use.

Sanitation

Eliminating places that may provide rodents with shelter, water and food is the purpose of sanitation.

- Eliminate debris in and around buildings and grounds.
- Trim weeds and brush and keep grass short (3 inches or less) to minimize cover and food sources around the building perimeter.
- Clean up food waste and spillage daily.
- Store food 12 to 15 inches off the floor and 12 to 18 inches away from the wall for easy inspection and sanitation. Use rodent-proof containers when possible.
- Between storage areas, allow 24-inch aisles for easier inspection and sanitation.
- Screen dumpster drainage holes with hardware cloth.
- Don't leave pet food out overnight.
- Eliminate water sources available to rodents.

Trapping

In sensitive areas where rodenticide use isn't permitted, traps are especially useful. Traps also prevent rodent deaths in inaccessible areas. After rodents and their patterns have been identified, follow the appropriate methods below.

- Place mechanical or snap traps and glue boards in areas unsuitable for rodenticide applications.
- Position snap traps and glue boards to intercept rodents in runways. Place snap traps with the trigger toward the runway - generally along a wall, in corners, behind and under objects and near abundant tracks and droppings. Snap traps also may be attached to pipes and beams used as runways.
- More traps are better than fewer traps.
- Bait snap traps with food that's more attractive than other readily available food sources, such as gumdrops, peanut butter, bacon, nutmeats or dried fruit (raisins). Secure bait to the snap trap trigger - a length of thread works well. For rats, fish (tuna) and meat (cat/dog food) may be used to bait traps. Glue boards can be baited, if necessary, with non-oily foods. The use of peanut butter, bacon and other oily, greasy foods will cause the glue to lose its stickiness.
- Glue boards shouldn't be used in areas with excessive dust or wetness - both elements make glue boards ineffective.
- Check glue boards frequently to prevent rodents from escaping.
- For mice, repeating or automatic mechanical traps may be used. Bait repeating traps with food that won't spoil.

Trapping Tips:

Store snap traps away from insecticides and chemicals that may impart a flavor. Remember, rodents have a keen sense of taste.

Bait snap traps using nesting materials, such as cotton or dental floss, with a drop of vanilla. Mice constantly look for nesting material.

BAITING
When the situation permits, rodenticides usually provide the most cost-effective approach to rodent control. Select a rodenticide with an active ingredient and formulation that works well for the particular environment. Correct bait placement is key to an effective integrated pest management program. Proper placement insures rapid rodent control and protects children, pets and non-target animals from bait contact.

Rules-of-Thumb

- Neophobia - the fear of new objects - makes roof rats and Norway rats extremely nervous about changes in their territory. It takes several days for rats to accept a new object in their environment, including bait stations.
- Place rodenticides in areas inaccessible to children and non-target animals, preferably in properly installed, tamper-resistant bait stations. Bait stations not only provide added security for children and non-target animals, but also protect bait from the elements and provide a comfortable place for rodents to feed and groom.
- Use the proper rodenticide bait for the target rodent and the best formulation for the environment. Maki paraffinized pellets and meal or Rozol Tracking Powder work well for burrow treatment. In fact, Maki is the only pelleted rodenticide on the market that is parraffinized to withstand the moist environment in some burrows.
- Using information obtained during the inspection process, place baits in rodent runways.
- Use a sufficient amount of product to assure an uninterrupted supply of bait between service visits.
- Tracking powder can be used in wall voids and in burrows adjacent to buildings, if suspected as a means of entry. It is most effective in dry areas where food sources are plentiful. Rodents groom themselves and each other approximately 20 percent of their waking hours. Rodenticide is ingested during this time.
- In areas of identified mice activity, rodenticide bait placements should be no further than 8 to 12 feet apart due to their limited home range.
- In areas of identified rat activity, rodenticides should be placed every 15 to 30 feet.
- To speed up service calls, keep a detailed record of bait station placements, rodenticide formulations, amounts used and service dates.
- Prebaiting is the process of placing non-toxic bait prior to toxic bait in order to increase product acceptance. This practice generally is used for acute baits (e.g., zinc phosphide) with low palatability. Prebaiting is usually unnecessary with highly palatable anticoagulant baits.

These are common practices used throughout the control industry. Some or all of which may be used during your rodent control program. Please talk to your customer service representative or technician for more details specific to your service.

Rodenticides

Two primary types of rodenticide baits are available - non-anticoagulants (acute) and anticoagulants.

Non-anticoagulants. Bromethalin and zinc phosphide based products are examples of acute baits which have no antidote. Palatability is generally low with products containing these active ingredients. Non-anticoagulants are considered single-feed baits because rodents typically stop feeding after one meal. If a lethal dose is ingested, rodents usually die within 24 hours. If a sub-lethal dose is eaten, rodents tend to develop bait shyness.

Anticoagulants. The preferred rodenticide type among rodent control professionals, anticoagulants inhibit the blood-clotting mechanism, causing rodents to die from internal bleeding. Some of these rodenticides are single-feed and effective within several days. The delayed effects of anticoagulants help reduce bait shyness. The antidote to human or non-target animal poisoning is Vitamin K1.

NORWAY RAT

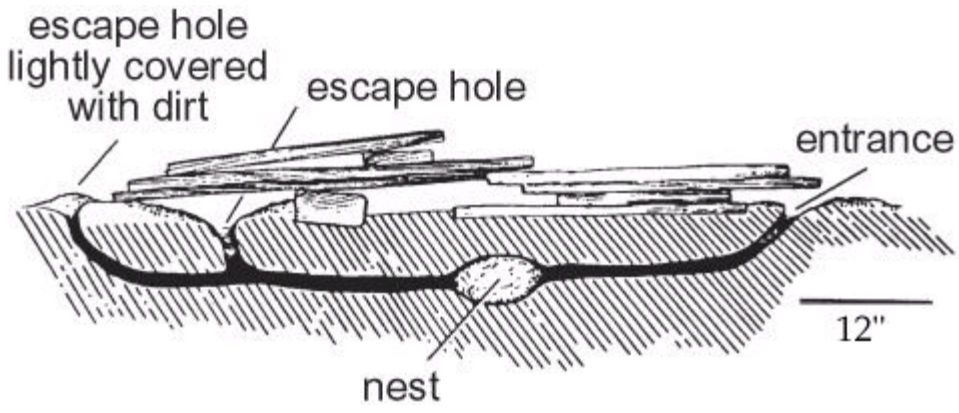
Rattus norvegicus
Other Names: brown rat, gray rat, common rat, house rat, wharf rat, sewer rat, barn rat and water rat.
Ears. Ears are close to the body and won't cover the eyes if bent forward.
Eyes. Eyes are small. Because rats are colorblind and have poor eyesight, they primarily see light, shadow and movement.
Nose. Nose and muzzle are blunt. Norway rats have an acute sense of smell.
Color. Usually grayish-brown, but color may vary from a pure gray to a blackish- or reddish-brown. The underside is gray to yellow-white. Norway rats are often completely black.
Teeth. The gnaw pattern of rats is 1/8 inch. Rats are able to gnaw through wood, lead, aluminum, copper, cinder block and uncured concrete.
Droppings. Droppings have blunt ends and are about 3/4 inch (2 cm) in. Fresh droppings are soft and dark in color. A Norway rat averages 30 to 180 droppings per day.
Tail. Tail is shorter than head and body - 6 to 81/2 inches (15 to 22 cm) long. Tail is dark on top with a lighter underside.
Body. Body is heavy and thick, 7 to 10 inches (18 to 25 cm) long. Average weight is 10 to 17 ounces (284 to 482 g).
Life: Adult life is approx. 18 months. Females will have 3-7 litters per year with 6-18 young in each litter.
Habits. Norway rats burrow extensively in soil and are excellent swimmers and good climbers. They usually nest in basements and lower portions of buildings. Nocturnal. Most activity and feeding takes place between a half-hour after sunset and a half-hour before sunrise. Very strong social hierarchy - the biggest and strongest Norway rats get the best food and harborage.
Food Preferences and Consumption. Omnivores. Meats, fish, flour, cereal grains, fruits and vegetables. Eats almost any human food. Rats visit fewer food sites than mice, but eat more at each site. Consumes 3/4 to 1 ounce of food each day. Requires water daily to survive - drinks 1/2 to 1 ounce of water daily.
Geographic range: Best suited for temperate zones. Due to excellent adaptability, Norway rats are found everywhere in the United States.
Facts:
Rats explore their territory of 100 to 300 feet daily.
Rats can swim up to a mile.

ROOF RAT

Rattus rattus
Other Names: Alexandrian rat, black rat, fruit rat and ship rat.
Body. Body is slender, 61/2 to 8 inches (17 to 20 cm) long. Average weight is 6 to 12 ounces (170 to 340 g).
Life: Adult life is approx. 16 months. Females will have 3-7 litters per year with 6-14 young in each litter.
Color. Varies from black to brownish-gray. The underside varies from gray to white.
Nose. Nose and muzzle are pointed. Roof rats have an acute sense of smell.
Habits. Able to swing, jump and climb, roof rats usually enter and nest in upper portions of buildings. May nest outside in trees (especially palm), ivy and similar vegetation. Burrow very little. Nocturnal. Most activity and feeding takes place between a half-hour after sunset and a half-hour before sunrise. Strong social hierarchy.
Teeth. The gnaw pattern of rats is 1/8 inch. Rats are able to gnaw through wood, lead, aluminum, copper, cinder block and uncured concrete.
Tail. Hairless and longer than the head and body - 71/2 to 10 inches (19 to 25 cm) long. Uniform color from top to underside.
Ears. Ears are large and cover the eyes if bent forward.
Eyes. Eyes are large and prominent. Because rats are colorblind and have poor eyesight, they primarily see light, shadow and movement.
Droppings. Droppings have pointed ends and are about 1/2 inch (1 cm) in length. Fresh droppings are soft and dark in color. A roof rat averages 30 to 180 droppings per day.
Food Preferences and Consumption. Omnivores. Seeds, fruits, vegetables, eggs and grain. Rats visit fewer food sites than mice, but eat more at each site. Consumes 1/2 to 1 ounce of food daily. Drinks up to 1 ounce of water daily.
Geographcic Range Best suited for tropical and semitropical zones, roof rats are found along the Pacific Coast, in Hawaii, along the lower half of the East Coast, throughout the Gulf States and major river systems (i.e., Mississippi River).
Facts:
Rats explore their territory of 100 to 300 feet daily. Rats can survive a fall from up to 25 feet onto a hard surface

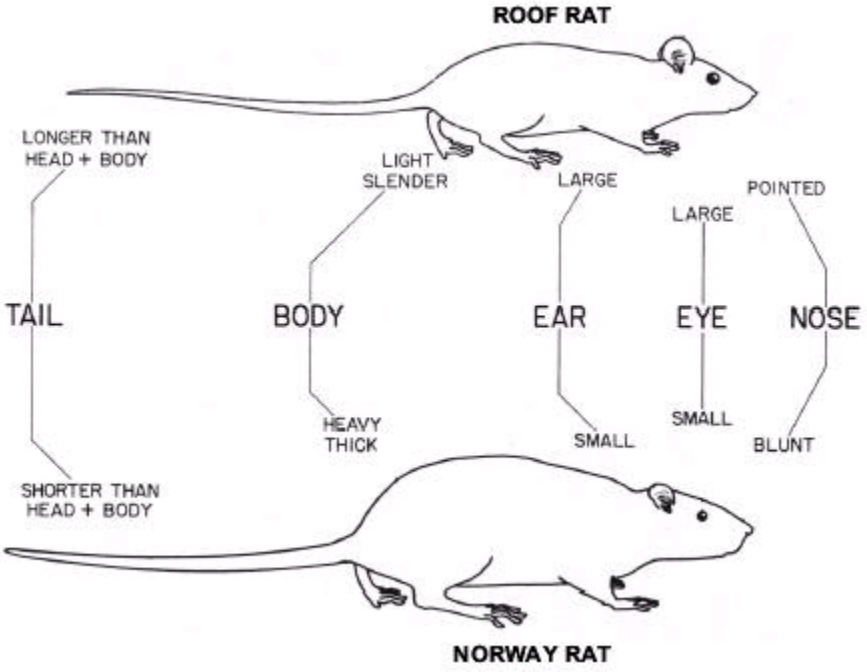
House Mouse

Mus musculus
Other Names: common house mouse.
Eyes. Eyes are small and somewhat protruding. Mice are colorblind and can only recognize objects up to 10 feet away.
Ears. Relatively large ears for its size.
Teeth. The gnaw pattern of mice is less than 1/16 inch.
Body. Body is small, pear-shaped and slender, 2 to 31/2 inches (5 to 9 cm) long. Average weight is 5/8 to 1 ounce (18 to 28 g).
Life: Adult life is approx. 15-18 months. Females will have 6 litters per year with 6 young in each litter.
Color. Generally grayish-brown on top. The underside is a light cream color.
Habits. Excellent climbers. Can be found in cultivated fields, at or below ground level, or in upper stories of skyscrapers. Curious and inquisitive. Mice explore their limited home range of 10 to 30 feet daily for newly introduced objects. Nocturnal. Most activity and feeding takes place between a half-hour after sunset and a half-hour before sunrise. Strong social hierarchy.
Food Preferences and Consumption. Omnivores. Seeds (preferred food), cereal grains, fruits, vegetables and meats. Mice frequent many feeding sites - often 20 to 30 - during their active period, eating small amounts of food from each site. Daily consumption: 1/10 ounce. Water is not essential to survival if food contains at least 16 percent moisture.
Droppings. Droppings have pointed ends and are about 1/4 inch (.64 cm) in. Fresh droppings are soft and dark in color. A house mouse averages 50 droppings per day.
Tail. The tail is 3 to 4 inches (7 to 10 cm) long, semi-naked and longer than the head and body combined.
Geographic range: Throughout the United States and southwest Canada, north to central British Columbia and along the Pacific Coast to Alaska.
Facts:
Mice can survive an 8-foot fall onto a hard surface.
A mouse travels 12 feet per second.



Norway rat burrow beneath a pile of boards.

From Hygnstrom, S. E., R. M. Timm, and G. E. Larson, eds. 1994. *Prevention and Control of Wildlife Damage.* Vol. 1. Lincoln: Univ. Neb. Coop. Ext.



Key characteristics of Norway and roof rats.

From Bjornson, B. F., and C. V. Wright. 1960 (revised). *Control of Domestic Rats and Mice.* Center for Disease Control, USDHEW, Public Health Service Pub. 563.

Droppings of house mouse (left), roof rat (center), and Norway rat (right).

Photo by unknown photographer.